

**Amendments to the Claims**

Please amend Claims 1, 8 and 18. Please add new Claims 25 and 26. The Claim Listing below will replace all prior versions of the claims in the application:

**Claim Listing**

1. (Currently amended) A method of removing contaminants from a stream of carbon dioxide ( $\text{CO}_2$ ), comprising:  
contacting a stream of  $\text{CO}_2$  with a quantity of at least one mixed metal oxide for a period of time to reduce the contaminant content of the stream, wherein the mixed metal oxide includes: iron (Fe) and manganese oxide ( $\text{MnO}_x$ ); nickel oxide (NiO) and titanium oxide ( $\text{TiO}_x$ ); palladium oxide ( $\text{PdO}_x$ ) and cerium oxide ( $\text{CeO}_x$ ); or vanadium oxides ( $\text{VO}_x$ ); ~~nickel (Ni) and nickel oxide (NiO); or iron oxides ( $\text{Fe}_x\text{O}_y$ ).~~
2. (Previously presented) The method of claim 1, wherein the contaminant content is reduced to not more than 100 parts per billion (ppb).
3. (Previously presented) The method of claim 1, wherein the contaminant content is reduced to not more than 10 ppb.
4. (Previously presented) The method of claim 1, wherein the contaminant content is reduced to not more than 1 ppb.
- 5-7. Canceled
8. (Currently amended) The method of claim 1, wherein the mixed metal oxide includes: iron (Fe) and a manganese oxide selected from the group consisting of MnO and  $\text{MnO}_2$ ; or vanadium oxides selected from the group consisting of VO,  $\text{VO}_2$ ,  $\text{V}_2\text{O}_3$  and  $\text{V}_2\text{O}_5$ ; ~~nickel (Ni) and nickel oxide (NiO); or FeO and  $\text{Fe}_2\text{O}_3$ .~~

9. (Previously presented) A method for activation and regeneration of mixed metal oxide adsorbents for the purification of carbon dioxide ( $\text{CO}_2$ ) comprising:

heating a mixed metal oxide adsorbent that has been used for the purification of carbon dioxide to a first temperature to release contaminants adsorbed thereto, wherein the adsorbent includes at least one mixed metal oxide, the mixed metal oxide including: iron (Fe) and manganese oxide ( $\text{MnO}_x$ ); nickel oxide (NiO) and titanium oxide ( $\text{TiO}_x$ ); palladium oxide ( $\text{PdO}_x$ ) and cerium oxide ( $\text{CeO}_x$ ); vanadium oxides ( $\text{VO}_x$ ); nickel (Ni) and nickel oxide (NiO); or iron oxides ( $\text{Fe}_x\text{O}_y$ );

exposing the adsorbent to an oxidizing agent to oxidize the adsorbent;

cooling the oxidized adsorbent to a second temperature; and

exposing the cooled adsorbent to a reducing agent to produce a mixed metal oxide usable for the purification of carbon dioxide ( $\text{CO}_2$ ).

10. (Original) The method of claim 9, wherein the first temperature is between about  $300^\circ\text{C}$  to about  $550^\circ\text{C}$ .
11. (Original) The method of claim 10, wherein the first temperature is about  $400^\circ\text{C}$ .
12. (Previously presented) The method of claim 9, wherein the oxidizing agent comprises oxygen ( $\text{O}_2$ ).
13. (Previously presented) The method of claim 9, wherein the second temperature is between about  $100^\circ\text{C}$  to about  $250^\circ\text{C}$ .
14. (Previously presented) The method of claim 9, wherein the reducing agent comprises a mixture of hydrogen ( $\text{H}_2$ ) and an inert gas.
15. (Previously presented) The method of claim 14, wherein the hydrogen gas comprises between about 1% to about 5% of the mixture by volume.

16. (Previously presented) The method of claim 14, wherein the inert gas is selected from the group consisting of nitrogen ( $N_2$ ) and argon and combinations thereof.
17. (Previously presented) A method for continuous purification of carbon dioxide ( $CO_2$ ), comprising:
  - a) purifying  $CO_2$  by contacting a stream of  $CO_2$  with a quantity of at least one mixed metal oxide for a period of time to reduce a contaminant content of the stream in a first bed of a dual bed purifier apparatus;
  - b) regenerating an adsorbent in a second bed of the dual bed purifier apparatus by heating the adsorbent to a first temperature to release contaminants adsorbed thereto; exposing the adsorbent to an oxidizing agent to oxidize the adsorbent; cooling the oxidized adsorbent to a second temperature; and exposing the cooled adsorbent to a reducing agent to produce a mixed metal oxide during the coincident purification of the  $CO_2$  in the previous step; followed by
  - c) purifying  $CO_2$  as in step a in the second bed after completion of regeneration of the adsorbent as in step b, coincident with the regeneration of the adsorbent of the first bed; and
  - d) repeating steps a) – c) for continuous purification.
18. (Currently amended) A method of removing contaminants from a stream of carbon dioxide ( $CO_2$ ), comprising contacting a stream of  $CO_2$  with a quantity of at least one mixed metal oxide for a period of time to reduce the contaminant content of the stream, ~~The method of Claim 1,~~ wherein the mixed metal oxide includes nickel (Ni) and nickel oxide (NiO).
19. (Previously presented) The method of Claim 9, wherein the mixed metal oxide includes: iron (Fe) and manganese oxide selected from the group consisting of MnO and  $MnO_2$ ; vanadium oxides selected from the group consisting of VO,  $VO_2$ ,  $V_2O_3$  and  $V_2O_5$ ; nickel (Ni) and nickel oxide (NiO); or FeO and  $Fe_2O_3$ .

20. (Previously presented) The method of Claim 19, wherein the mixed metal oxide includes nickel (Ni) and nickel oxide (NiO).
21. (Previously presented) The method of Claim 17, wherein the mixed metal oxide includes: iron (Fe) and manganese oxide ( $\text{MnO}_x$ ); nickel oxide (NiO) and titanium oxide ( $\text{TiO}_x$ ); palladium oxide ( $\text{PdO}_x$ ) and cerium oxide ( $\text{CeO}_x$ ); vanadium oxides ( $\text{VO}_x$ ); nickel (Ni) and nickel oxide (NiO); or iron oxides ( $\text{Fe}_x\text{O}_y$ ).
22. (Previously presented) The method of Claim 21, wherein the mixed metal oxide includes: iron (Fe) and manganese oxide selected from the group consisting of MnO and  $\text{MnO}_2$ ; vanadium oxides selected from the group consisting of VO,  $\text{VO}_2$ ,  $\text{V}_2\text{O}_3$  and  $\text{V}_2\text{O}_5$ ; nickel (Ni) and nickel oxide (NiO); or FeO and  $\text{Fe}_2\text{O}_3$ .
23. (Previously presented) The method of Claim 22, wherein the mixed metal oxide includes nickel (Ni) and nickel oxide (NiO).
24. (Previously presented) A method for activation and regeneration of a mixed metal oxide adsorbent for the purification of carbon dioxide ( $\text{CO}_2$ ), comprising:
  - heating a mixed metal oxide adsorbent that has been used for the purification of carbon dioxide to a first temperature to release contaminants adsorbed thereto;
  - exposing the adsorbent to an oxidizing agent to oxidize the adsorbent;
  - cooling the oxidized adsorbent to a second temperature; and
  - exposing the cooled adsorbent to a reducing agent to produce a mixed metal oxide usable for the purification of carbon dioxide ( $\text{CO}_2$ ), wherein the reducing agent comprises a mixture of hydrogen ( $\text{H}_2$ ) and an inert gas, and wherein the hydrogen gas comprises between about 1% to about 5% of the mixture by volume.
25. (New) The method of Claim 9, wherein the adsorbent includes at least one mixed metal oxide, the mixed metal oxide including: iron (Fe) and manganese oxide ( $\text{MnO}_x$ ); nickel oxide (NiO) and titanium oxide ( $\text{TiO}_x$ ); palladium oxide ( $\text{PdO}_x$ ) and cerium oxide ( $\text{CeO}_x$ ); or vanadium oxides ( $\text{VO}_x$ ).

26. (New) The method of Claim 17, wherein the adsorbent includes at least one mixed metal oxide, the mixed metal oxide including: iron (Fe) and manganese oxide ( $\text{MnO}_x$ ); nickel oxide ( $\text{NiO}$ ) and titanium oxide ( $\text{TiO}_x$ ); palladium oxide ( $\text{PdO}_x$ ) and cerium oxide ( $\text{CeO}_x$ ); or vanadium oxides ( $\text{VO}_x$ ).